Signal to Syntax; Bootstrapping from Speech to Grammar in Early Acquisition [Review of: J. Morgan, K. Demuth (1999) Signal to Syntax; Bootstrapping from Speech to Grammar in Early Acquisition]

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Book Reviews

Signal to syntax: Bootstrapping from speech to grammar in early acquisition. James L. Morgan and Katherine Demuth (Eds.). Mahwah, NJ: Erlbaum, 1996. Pp. 487.

In February 1993, a conference was organized at Brown University, Providence, RI, where an interesting mélange of theoretical linguists, computer scientists, acousticians, psycholinguists, and cognitive scientists discussed issues bearing on how children's perception and representation of the speech stream may contribute to the acquisition of syntax. The contents of the current volume are based on the proceedings of this conference.

The basic idea for the conference (and the book) was a good one. Morgan and Demuth had noticed that, in accounts of children's grammatical development, little attention had been paid to factors involving the perception, representation, or production of speech, despite the large amount of work done in these areas. In bringing together scholars of different plumage but with the same basic research interest, they sought to bridge the disciplinary gaps that might have resulted in the paucity of influence of work on infant perception and representation on work in language acquisition. Both sides could benefit from the exchange of information. On the one hand, theories of grammatical development might become simpler were an appropriately rich input representation assumed, while on the other hand, a theory of grammar is needed to test phonological bootstrapping hypotheses. Another goal of the conference was to encourage further research into the question of whether perceptual analyses yield information about some basic properties of grammar. The conference apparently was a success, and some of the enthusiasm has found its way into the proceedings.

The introductory chapter by the editors is very enlightening. It is not only an introduction to the different parts and chapters of the book, but also a clear synopsis of the main results of the research presented in the different chapters. It is worth rereading, after having savored the entire volume, in order to regain a grip on the large amount of information. Apart from the introduction, there are 24 chapters, distributed over five parts, followed by an author index and a subject index. Part I, "The Nature, Perception, and Representation of Input Speech," contains four introductory chapters in order to familiarize the reader with the data, methodology, and arguments from different disciplines. Eimas presents an account of the research on infant speech perception and representation. Dresher introduces prosodic and metrical theory. Lieberman presents a biological perspective on the study of prosody and draws attention to the difficulty of using appropriate acoustic parameters in studies of prosodic bootstrapping. Price and Ostendorf give an outline of how statistical and linguistic models of prosody can be combined and how this combination can increase the knowledge about the role of prosody in language processing.

Part II, "Speech and the Acquisition of Words," contains six chapters that discuss different aspects of early word-level speech segmentation. The chapters by Cutler and by Mehler, Dupoux, Nazzi, and Dehaene-Lambertz discuss evidence showing that the rhythmic structure of a language can be exploited to find word boundaries. Different rhythmic structures are exploited in different languages. Aslin, Woodward, LaMendola, and Bever present the results of a study on the way spoken language to infants is structured in a word-learning task. Bernstein Ratner presents a refreshing discussion of the nature of the speech input to infants. In the chapter by Gerken, the role of stress in early speech segmentation is discussed, combining evidence from both child productions and perception experiments. Finally, Demuth discusses the prosodic structure of early words and suggests that children's sensitivity to the prosodic structure of words comes in part from universal grammar, which provides children with the linguistic notion of the minimal word as a binary foot.

Part III, "Speech and the Acquisition of Grammatical Morphology and Form Classes," contains five chapters that consider various relations between prosody and morphology. Selkirk provides a phonological account of grammatical function words in terms of prosodic words and suggests that knowledge of this phonological structure might help the language learner to distinguish between function words and lexical words. Peters and Stromqvist present their "spotlight" hypothesis: grammatical morphemes that regularly end up in a perceptually salient prosodic pattern are focused on earlier by the language learner than grammatical morphemes that are not regularly spotlighted in this way. Leonard and Eyer reveal an important role for the relative duration of grammatical morphemes in the processing of these morphemes by SL1 children. The chapters by Kelly and by Morgan, Shi, and Allopenna discuss several phonological cues to grammatical class and present evidence that people are sensitive to these cues, too.

Part IV, "Speech and the Acquisition of Phrase Structure," contains six chapters that consider the relation between prosody and phrase structure. Venditti, Jun, and Beckman conclude that, comparing data from Japanese, Korean, and English, it is not clear whether prosody facilitates the acquisition of syntactic structure or whether syntactic categories facilitate the acquisition of prosodic structures. Mazuka suggests that, based on suprasegmental cues, a branching head parameter is set by the language learner prior to the onset of the one-word stage. Steedman sees a more important role for semantics than for prosody in the acquisition of syntax. Fisher and Tokura, however, argue that, although there are limitations, spontaneous speech to infants can provide both direct and indirect acoustic cues to syntactic structure. Fernald and McRoberts present a solid critical analysis of the argument and evidence for prosodic bootstrapping and conclude that the role of prosody in revealing language structure has been oversimplified. Jusczyk and Kemler Nelson discuss whether infants are able to detect acoustic correlates of syntactic structure in speech and whether they rely on these correlates in organizing the input. They, too, are cautious about the role of prosody in recovering the constituent structure of language, and they conclude that it is one of several possible probabilistic sources of information on which the infant can rely.

Part V, "Speech and the Acquisition of Language," contains three chapters that consider prosodic bootstrapping in a broader developmental perspective. Gerken proposes a model of syntax acquisition where the learner combines phonological information with distributional information. Werker, Lloyd, and Pegg argue that, in order to understand the role of the input on infant speech processing, it is necessary to take into account the changing characteristics of the input, the different language processing biases of the infant at different points in time, and the infant's emerging perceptual and cognitive skills. Hirsch-Pasek, Tucker, and Golinkoff assume that language learners need to integrate information from different input sources in order to induce the grammar of their native language, and they present a dynamic systems view on the acquisition process with a strong initial role for prosody.

The volume pretty much contains all you ever wanted to know about prosodic bootstrapping, and for the most part the articles are very readable. For the relative outsider, it does not really matter that by now the conference was held a while ago, although one would like to know how things have developed over the years. Some information is repeated over and over, which is the consequence of a book consisting of separate articles. On the one hand, it is comforting to know that some results are apparently generally accepted, and that research can proceed from there. On the other hand, some of these generally accepted results are contradicted in other chapters, or the method of acquiring these results is questioned. To name one example, in several chapters it is mentioned that infants are born sensitive to clause-typical prosodic patterns. This is inferred from the research by Hirsch-Pasek et al. (1987) and Jusczyk (1989), which indicated that infants preferred (listened significantly longer to) speech in which pauses coincided with syntactic units over speech in which pauses did not coincide with syntactic units. Moreover, in 4-month-old infants, this preference applied to speech from the native language and to speech from a nonnative language, whereas 6-month-olds only preferred coincident speech in their native language. However, Fernald and McRoberts argue that the noncoincident speech used in the experiments is unnatural, not only because the pause does not coincide with a syntactic boundary, but also because the onset and offset characteristics of the manipulated speech signal are different from those of naturally produced speech. The human vocal apparatus cannot produce the vocalizations that occurred in the manipulated speech signal. The results of the study could thus be interpreted in a different way: infants prefer physiologically possible vocalizations. Furthermore, Fernald and McRoberts could not replicate the finding that 4-month-olds preferred coincident speech in their native language and nonnative language. In their study, 4-month-old infants did not distinguish between coincident and noncoincident speech. A preference for noncoincident speech in the native language was found in 10-month-olds. According to Fernald and McRoberts, then, the widely held view that infants are sensitive to clausal units needs to be refined to the more limited observation that, by 7 months, infants have learned to distinguish continuous vocalizations in their native language from artificially interrupted speech.

The critical observations of Fernald and McRoberts and those made by Lieberman in his chapter may make the reader who is not very well acquainted with

the field a little wary about the results presented in some of the other chapters. It is here the reader misses the discussions that, no doubt, followed the presentation of the papers during the conference.

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Cognitive processes in translation and interpreting. Joseph H. Danks, Gregory M. Shreve, Stephen B. Fountain, and Michael K. McBeath (Eds.). London: Sage, 1997. Pp. 294.

In the flourishing field of translation studies, two main trends can be discerned. One trend, which is oriented to translation as cultural practice, has upgraded its role in *humanae litterae* from ancillary to main propeller in the construction and innovation of cultural paradigms and identity-forming processes.

The other, more exquisitely linguistic, trend has brought about a shift of focus – from the description of translation procedures to an observation of translation processes. This change has occurred in the wake of textlinguistic models emphasizing a "processual" view of the text – one in which meaning and coherence are seen as relevant manifestations of the interaction of mind and text rather than static textual attributes.

Within this dynamic framework, the activity of translating develops at the "interface" of textual comprehension and production – uniquely so, because the interface involves crosscultural and crosslinguistic work. Translators match their own mental world to the one that is textualized in the source text; they "make sense of" and "make sense for": that is, they re-map the situated meanings of the source text onto the semantic and pragmatic coordinates of the new text. These subprocesses of (source) text comprehension, cultural/linguistic mediation, and (target) text production are not activated in a linear fashion but with much to-ing and fro-ing, constantly monitored by "check and revise" cognitive strategies.

A host of questions arise which are of consequence for the practice, study, and pedagogy of translation/interpreting. How does apprentice behavior differ from expert behavior, relative to a specific domain and a specific set of languages? How do translators acquire the mature competence to "see" both macrotextual problems and more local, discrete-item problems and to take them jointly into account while selecting and evaluating competing solutions? How can factors such as self-confidence or stress affect the management of strategies? What kind of pedagogy is best suited to stimulate consciousness-raising and metacognition?

The nature of these queries shows that the "processual" revolution brought about by textlinguistics and pragmatics has increasingly removed translation studies from the realm of stylistics and contrastive linguistics and increasingly placed them on the interdisciplinary frontier of cognitive science, where the empirical observation of translation activities becomes corroborated by the models and methods of cognitive psychology, psycholinguistics, and neurophysiology.

The competences to be expected of interpreters and translators extend well beyond the sophisticated command of first/second language (frequently also a third one, with interpreters) and of the relative "ethnographies" of speaking and writing (i.e., the textualization procedures related to the culturally coded canons which govern distinctive discourse genres). Even more crucial for professional performance is the development of lower level as well as higher order cognitive monitoring, autonomy in decision making, and the ability to preside over and maximize one's learning-to-learn strategies. From the research end, this line of work is focused on understanding "what goes on in the translator's head" – to echo the very title of a pioneering investigation using translation protocols (Krings, 1986). Indeed, the incorporation of cognitive models has been a privileged tack in the last decade, particularly in interpreting research.

Thus, it was high time for translation/interpreting scholars and cognitive scientists jointly to explore and to make mutually explicit their needs, aims, and methods. This was precisely the purpose of the event that is now documented in this prestigious volume. Edited with extreme care, the book provides an accurate record of the conference from which it originated and also incorporates the authors' post hoc reflections, with considerable networking across contributions. The preface, introduction, and final chapter continue and further enhance this effort to highlight relevant issues and common themes or points of departure between authors. Another element that makes this study reader friendly and accessible is the rigorous approach to terminology, which is constantly explained or made comprehensible, and the concern to clarify concepts and methods.

Innovative events such as a conference of this import involve high expectations and at least some concern. Here, on the side of translation scholars, expectations are primarily focused on acquiring a firmer grasp of methods and models in cognitive psychology for positive transfer into more ambitious, as well as rigorous, investigations of the cognitive dimensions of translation and interpreting which will positively affect both practice and pedagogy; cognitive psychologists and psycholinguists are attracted by the unique crosslinguistic dimension of translation/interpreting and envisage that a closer understanding of the cognitive processes involved will also shed light on the (cognitive) language processing of monolingual speakers.

Thus, the central questions are: (a) the unique features of translation/interpreting vis-à-vis monolingual processes geared to "receptive" and "productive" competences, on the one hand, and bilingual language processing, on the other hand, so as to clarify the specific, unique mechanisms involved in translation; (b) the relevant cognitive parameters in translation and interpreting tasks; (c) the cognitive dimensions in the learning of such tasks; and (d) the research

methods and models for investigating the cognitive processes of translation and interpreting.

The tensions involved in this exchange across discipline boundaries are spelled out in the introductory account of the conference and become palpably manifest in some of the contributions. Predictably, translation theorists fear that cognitive models may shift the focus of research "down" (as well as "back" – and the ironic wording here is mine) to word units – hardly an advantage for a generation of scholars who have made textual dynamics their central concern and, I would like to add, a veritable setback. (For it is translators who are constantly faced with resistant folk theories of translation, which interfere with good practice by holding on to the narrow view of translation as mere word-for-word replacement.) Cognitive science needs replicable, testable models of the component processes of translation to construct "full process" models, capable of accounting for the interaction of such component processes in the actual translation or interpreting performance without running the risk of confounding variables.

Using the Latin word *translatio* to cover both translation and interpretation, Neubert argues for their interdisciplinary nature and formulates six postulates to identify the constituting elements of their uniqueness within the broader spectrum of bilingual language activity. It is hard to do justice to the depth, elegance, and complexity of this chapter, which distillates more than 30 years of experience in the study of translation and interpreting. Perhaps the best way, other than recommending reading it, is to highlight the passionate emphasis on textuality. *Translatio* does not so much invest languages as situate texts; it does not mean getting engulfed in a sea of correspondences but rather working from a macro-textual, pragmatically ingrained perspective, so that "psycholinguistic approaches to translation that are to have any hope of explaining the process must include an account of the textual processing that occurs in language mediation" (p. 12). This concern with the textual dimension goes hand in hand with the alarm about its possible loss in reductive cognitive models, and he defines his own contribution as a plea: "an exhortation to investigators to consider the extreme complexity of the translation process and the sophisticated creative processes that it must involve" (p. 20).

Considering the various forms of translation from the standpoint of difference in the type of processing involved, De Groot recognizes the relative neglect of translation in mainstream cognitive research and argues for the relevance of translation as a cognitive research topic which is "likely to reveal many interesting facets of human intellectual performance" (p. 29). She reviews the experimental literature, starting with her own research on translation from the bilingualism perspective, which focused on isolate words for the study of bilingual memory structures. These studies posit a two-tiered structure of representation: a layer where the representation of orthographic/phonological form is separately stored for L1 and L2 representations, with connections to a bottom layer for conceptual memory, which can store the meaning of a word in a single node or host the meaning traits of a word in a set of nodes.

A survey is offered of the experimental literature on the translation of sentences, the simultaneous interpretation of complete texts, and the comparison of

text translation with similar complex tasks so as to outline an approach to translation which is mindful of the concern of translation scholars that the complexity of translation be taken into account. This presentation is extremely useful and informative, with keynote discussions of the competing notions of "vertical" translation and "horizontal" transcoding, the usefulness of think-aloud protocols (TAPs), shadowing, and paraphrasing tasks. In the articulate section on experiments involving texts, the relevance of textual schemata is considered alongside the differentiation of stimulus material (spontaneous, unrehearsed, semiprepared, prepared oral, and prepared written).

The other contribution on basic cognitive processes, by Danks and Griffin, is concerned with the psycholinguistics of reading (and listening) in translation and interpreting. Cutting across the monumental literature (theoretical, experimental, pedagogical) on reading and listening, the authors here intend to show that translation and interpreting are language and languaging activities wherein some of the component processes of reading and listening (and speaking and writing) are put to work according to the demands and constraints of task, text, and translator, but are necessarily fashioned in a different way than in reading outside translation. Their contribution proceeds from a careful discussion of the contours of reading subprocesses within translation to a comparative analysis of reading and translation (and listening and interpretation) within a psycholinguistic perspective. The authors are indeed covering a lot of ground, and, what is more, it is the type of ground that is of crucial interest to those who teach language in translation/interpreting curricula. Such language courses attend precisely to the dual perspective of "language-as-object" and "language-as-meaning" outlined in this chapter. From this standpoint, a closer, more focused treatment of such key issues as metacognitive tasks, the specific task demands connected with science texts, or the problematics of translators as language-learning and translation-learning subjects would have been very appealing. However, it is the virtue of this book, like all good books, to make the reader yearn for more.

The pedagogical focus is explicit in Kiraly's study, which modeled translation processes from an information processing perspective, supported by his own observations on a sample of TAPs, and sought to posit his model within a constructivist approach to translation pedagogy. This chapter is dense with stimulating insights and useful elucidations. For example, in explaining how translation problems are escalated from the "intuitive workspace," where automatic processing occurs, to the "controlled processing center," where strategies are devised in a "multistage, problem-solving process," it is made clear that "strategies do not solve translation problems – they are merely plans that can be implemented in an attempt to solve problems." Interestingly, the usefulness of schemata for retrieval processes is pointed out, and an alternative perspective is offered within the framework of a "radically constructivist interpretation" (p. 157), but the alternative is not pursued any further theoretically.

The concluding section on teaching, which is geared to topics of paramount importance such as consciousness-raising and building self-confidence in the translator, is (rightly) critical of traditional, prescriptive pedagogy. Kiraly's choice of the constructivist classroom, perfectly justified in theoretical terms,

perhaps needs to be relativized a little and somewhat further articulated. The workshop atmosphere is ideal, but also elitist. Does a larger size class inevitably involve falling back on "instructional performance"? Is such performance always necessarily dull? Does the constructivist classroom work well when time is a critical factor?

Dancette's study also relies on TAPs for a description of the translation process. This contribution deals with comprehension in theoretical and experimental terms by hypothesizing that linguistic and extralinguistic material (textual, intertextual, extratextual information) are jointly processed to form a textual world (mental model, conceptual representation) of the source text. The conceptual mappings which make up this cognitive image are investigated here by analyzing and comparing the observable cues of the translation process in videotaped TAPs followed by interviews. The author's exploitation of the introspective procedure displays a primary interest in smaller scale, replicable models that have both explanatory power relative to the specific experimental situation and pedagogical value as tools for translator-awareness training. The presentation takes off from a careful evaluation of linguistic and cognitive theories of comprehension and meaning, highlighting the double pole (source text and target text) of meaning indeterminacy in translation and opting for a context-dependent view of meaning. The methodological account sheds light on the problems and advantages of empirical observation of cognitive phenomena and of translation in particular; its protocol analysis is both rigorous and insightful, defining key notions such as behavior, strategy, and process and extrapolating relevant indicators of efficient translator strategies.

Séguinot is concerned with the observation of intra- and intertranslator variability, a serious problem for the generalizing power of translation studies at all levels. While contrastivity scholars (in contrastive linguistics, textology, and rhetoric) mainly grapple with the problem of comparable texts, the question is considerably amplified in a cognitive perspective of variability. The size of the problem is aptly formulated:

> translation is a toolbox as opposed to an algorithmic skill. . . . a toolbox skill means there are a variety of choices. Those choices depend on skill, but also on the nature of the assignment, the functions of the text, the translating ideology held by the individual or the institution initiating the request, as well as the pragmatics of the translating situation. (p. 109)

The account of the experimental part of this study, which was focused on experienced translators, highlights the question of access routes to stored information (i.e., variability of the activation pathways to access meaning in connection with constraints dependent on task, strategies, and textual predictability). Here, the aspect of storage and transfer of meaning across languages becomes intertwined with the problem of experience, which produces culture-bound differentiation in the representation of lexical items.

Cultural representation – translation's Achilles' heel – is discussed by Gommlich. What is at stake here is the *vexata quaestio:* can culture be explicitly taught? Indeed, nothing less than this rather forbidding issue is involved in any pedagogical approach to cultural mediation. He approaches the issue from a critical linguistic standpoint as well as within the interlanguage hypothesis in

second language acquisition research and within a "cultural relevance" approach to context-dependent meaning. Representational perspective – that is, the specific "reporting position" instantiated by specific text – is both pervasive of all levels of translation and crucial for translation adequacy. It involves higher order cognitive operations whose development and activation are relative to the translator's own life experience and professional experience.

Though emphasizing the crucial value of second language acquisition in a second culture perspective for the development of "adequate second-culture images," Gommlich adds that "the worldview may alter from person to person or within a person's development" (p. 61). That is precisely the point. Representations are not static reflections but rather ongoing, dynamic construction processes, both socially and subjectively determined. To speak of "linguistic replication of the world" (p. 61) and cultural position "reflected in language" (p. 62) may sound somewhat at odds with a critical linguistic perspective. His definition seems less contradictory where he speaks of "formation": "language and its development are closely related to the cognitive development and the growth of a person, that is, with the formation of mental and linguistic representations of the world and communicative processes in this world" (p. 69). As he finds that representational perspective is resistant to change, even with intensive training in L2 and L2 rhetoric, his proposal is to teach "representational perspective extrapolation strategies," which are rooted in a mutual balancing and coordination of partial bilingualism and biculturalism.

How does the cognitive maturation of the autonomous, accomplished translator come about? And how is this figure defined in terms of abilities, when one takes into account the aspect of translator variability? The chapter by Shreve comes to grips with these key questions by considering the differences between various types of translation performance occasioned by different communicative needs within a functional communicative perspective of translation as a specialized form of communicative competence. This discussion contributes a definition of professional translation which clears the considerable confusion in the literature: "professional translation is a form of constructed translation that can be acquired by only undergoing certain kinds of deliberately sought out communicative experiences" (p. 125).

The emphasis on construction should not be overlooked. Bilinguals are not ipso facto translators, though they may well produce informal translation in nonprofessional settings; if they want to turn themselves into professionals, they must seek training. Shreve takes a very open-minded attitude to training: though institutionalized and socialized learning processes produce richer and more stable cognitive tools, there can nevertheless be other pathways of experience that eventually lead individuals to cover the "evolutionary space" between natural and constructed translation. What is more, the path is open ended because "there is no way to establish an end state for translation ability." There are some prerequisites that identify the professional state: namely, the development of "cluster of translating ability," which provide the capacity to adjust to situational circumstances and to produce documents which are both communicatively adequate and formally consonant to them.

Having set the defining traits of professional performance, the author identi-

fies two reasons for individual variability: individual cognitive style and individual learning history as regards translation skills. This is perhaps the sole occasion throughout the book in which cognitive styles and personality and temperament are explicitly considered. Likewise, this is almost the only contribution in which schematic knowledge is not mentioned in passing but specifically invoked – namely, as domain-specific restructuring – to account for novice-to-expert cognitive shifts in the evolution of translation competence. This is somewhat surprising, as one would have expected significant recourse to (or significant criticism of) schematic (and scriptal) knowledge by authors who account for cultural mapping and mapping of textual macrostructures.

Finally, in the concluding section of translation and learning, a data-driven model of translation acquisition is put forward wherein apprentice translators progressively learn to select from the experienced material the relevant cues for the task at hand and to engineer them into the translation process. The more frequent the exposure to the task, the quicker they will "see" what they "need" for efficient decision making. Thus, the relevant role of cues within this model, which relies on MacWhinney's competition model of language learning, leads the author to identify the chief propellers of the translator's evolving skills with the "nature, range and frequency of translation tasks over the course of a translator's acquisition history" (p. 136).

The chapter by Moser-Mercer provides both a comparative overview of interpreting research in the last two decades and an articulate picture of present trends, showing both the constraints that have so far inhibited interdisciplinary work and the potential for future dialogue across disciplines. Early full-process models encompassing a multistage view of interpreting involve an information processing approach (Gerver) into which the central feature of prediction is incorporated (Moser); more recent models offer processing options at different levels of abstraction and are attuned with psycholinguistic studies of language processing (as is the case with Kitano's model of spoken language translation), positing simultaneously operating analysis and production systems. The attempt by Paradis to integrate models of verbal information processing, the cerebral organization of bilingual language systems, and neurophysiological mechanisms for language and memory is criticized for simplifying the interpreting process.

Partial-process models include experimentally based, partial adaptations of language processing models: models postulating higher memory retention for increasing depth of processing for incoming information (Lambert as well as more recent, computer-based models using the levels-of-processing approach), whose explanatory power lies in terms of the interpreting process Moser-Mercer claims can be efficiently tested if the focus is shifted from memory to interpreting strategies; Dillinger's model of comprehension, contrasting bilinguals with no prior interpreting experience and experienced conference interpreters, which posits that comprehension in interpreting is but an extension of listening skills to an unusual task wherein semantic processing is emphasized; and Darò and Fabbro's memory-focused model of the interpreting process, investigating the memory systems jointly with the neurophysiological systems involved in the translation. Finally, the partial process models for computer-assisted interpreting, such as those by Wahlster for the VERBMOBIL project, have drawn exten-

sively on the machine translation tradition and are only starting to seek interdisciplinary cooperation with interpreting research.

The last section in this contribution offers a very stimulating and useful scenario of telecommunications and interpreting research, extrapolating major research issues such as visual information processing, bimodal speech perception, the impact of videoconferencing and of the "virtual" world on the quality of interpreting, "technostress," and psychosocial issues related to working alone for extended periods of time. The conclusions draw attention to the need for extensive empirical research on strategies, with explicit underscoring of "efficient problem-solving strategies": hence, comprehension strategies, prioritization strategies for workload management, and, in general, higher emphasis on the dynamic retrieval and mobilization of knowledge structures, especially in novice and expert interpreters. Finally, the "virtual" scenario demands interpreting research in close cooperation with the whole array of cognitive sciences.

The chapter by Gile comes to grips with the complexity of interpreting from the triple perspective of the practicing professional, the scientific observer, and the pedagogue. His presentation focuses on the explanatory power of the effort models. These models, initially developed for interpreter training purposes, were designed so as to yield explanations of complex operations in simultaneous and consecutive interpreting by largely simultaneous basic efforts, each involving specific processing capacity requirements attached to the task at hand. Because the total processing capacity available at any time is finite, capacity shortages connected with increased cognitive loading will explain errors and omissions, which, particularly in simultaneous interpretation, may well occur at a distance from the problematic SL speech segment requiring additional processing capacity.

The models involve two triggers for failure: saturation and individual deficit. Coping tactics can be generated to avoid or limit damage in connection with potential or occurring problems. The effort models, whose empirical validation is discussed in the concluding section, thus invest both theoretical issues, with regard to syntactic specificities involving heavy processing capacity requirements, and pedagogical issues, with regard to language practice. This is the only chapter, besides Gommlich's study, in which the usefulness of language-specific training in interpretation curricula is emphasized. One would have expected more concern with second language teaching; indeed, ad hoc syllabus design and language-teaching methodology can be of great assistance in fine-tuning translator/interpreter language skills in crucial ability areas such as the exploitation of cues for prediction, the identification of culturally coded discourse conventions, and familiarization with discourse genres and text types.

MacWhinney presents the application of the competition model, which is a functionalist version of psycholinguistic theory, to simultaneous interpreting. This detailed approach is committed to four major theoretical issues; lexical functionalism, connectivism, input-driven learning, and capacity. Hence, it underscores questions of cue usage, transfer, and capacity use, which have high explanatory power for simultaneous interpreting. At the same time, because creating overload in the processing system provides "the best window we have on the inner workings of language and thought" (p. 215), the study of simultaneous

interpreting can significantly contribute to general psycholinguistic theory. Interpreters differ from naive bilinguals because they have a split conceptual attention, with both a comprehension focus and a conversion focus: this second attentional focus for converting comprehended structure into "production structure" offers the opportunity to study the production process with the advantage of being able to control a great deal of the input to the production mechanism.

The final chapter, by Shreve and Diamond, offers a synthesis of relevant findings which clarify their significance and value for further research. It is presented in the form of a heuristic primarily intended for translation/interpreting researchers who want to become familiar with the psycholinguistic and cognitive literature, as well as for psycholinguistics and cognitive scientists who take an interest in the unique cognitive processes involved in translation and interpreting. The main dimensions in this heuristic are: (a) primary sensory processing; (b) short-term memory and buffering mechanisms; (c) filtering mechanisms for integrating buffer contents with outputs of long-term memory via selective activation and retrieval; (d) automatic and effortful processing of the results of activation and retrieval; (e) constraints placed on performance by a finite working memory system and, within this system, the management of competing demands; and (f) the structure of bilingual and translation long-term memory.

These headings subsume and formulate at a higher level of generalization and abstraction the problematics specifically discussed by the separate authors, and they point out the links with each constellation of ideas. Thus, this highly significant book manages to bridge past and recent research or rather to establish their mutual significance across disciplines, while spanning the conceptual distance between analyzing empirical data and unifying high-level theory. In the process, it constructs a role for cognitive science in the modelization of translation theory, and it legitimates this modelization in the study of the human mind. This is no small feat.

A few closing remarks are in order. While most contributions are rich with refreshing insights from the field, the chapters where theorizing is not immediately harnessed to empirical findings occasionally suffer from excessive conceptual density. Reformulation strategies, which are used to great advantage in the closing chapter (e.g., juxtaposing ordinary language and scientific terminology) might have been profitably used elsewhere.

The pedagogical focus is one of the strengths of the book. Future research might give it even more prominence, along with a sharper and more articulate treatment, with reference to translation strategies to be transposed into teaching methodology but also, and particularly, with reference to language learning. Longitudinal studies on translation and interpreting students prior to and well after entrance to the profession could provide effective monitoring on the significance of translation/interpreting methodology as well as language teaching in the respective curricula.

Two issues emerge from this very rich volume as further avenues for future inquiry. The first one concerns the "soft cognition" side of intrapsychological variability: for example, personal acquisition, learning and socialization history, personality development, and the development of self-confidence – the latter is

also worthy of being explored in terms of global and specific self-esteem – for which individual case studies could provide a useful qualitative approach. Since the translator's "black box" is socially situated, it should be interesting to explore how "hardwired" cognition intersects with variables pertaining to individual attitudes, emotions, and beliefs. Such psychosocial aspects are of considerable consequence for a facilitating pedagogical approach aiming to assist in the apprentice translator's internal regulation of goals as well as the development of positive feelings of adjustment to such goals.

The second one relates to the treatment of meaning, which could usefully highlight, particularly for the exploitation of cues, not only a context-dependent view but also a more explicitly constitutive framework wherein text also affects and modifies context or text and talk are reciprocally affected. This is all the more significant with translation activities such as dubbing, translation of scripts, or translation/transposition connected with multimedia presentations, which are not specifically treated in the book.

The European Commission is promoting "best practice" projects for translation and interpreting (GUCE C 381/29 of 16.12.1997). *Cognitive Processes in Translation and Interpreting* defines the interconnections of practice, theory, and pedagogy which form and inform serious professional activity and thus is a seminal contribution to the field.

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Writing development: An interdisciplinary view. Clotilde Pontecorvo (Ed.). Amsterdam: John Benjamins, 1997. Pp. 367.

The present book, sponsored by the European Science Foundation, Strasbourg, is the result of several workshops that have taken place since 1992 on the problems specific to literacy acquisition, especially in young children. The editor, Clotilde Pontecorvo of the University of Rome, has a worldwide reputation as an educational psychologist who has dealt with pivotal problems of school learning and especially with the totality of literacy in its basic reading and writing constituents.

She has guided the discussion on the social and scientific relevance of the problems concerning written language and literacy with a group of scholars from different countries who were conscious of the need to explore the cultural and psychological processes involved in the development, acquisition, and use of written language from a wide range of disciplines, including the anthropology of writing, the history of culture, and the diffusion and teaching of writing in modern Europe starting from very ancient times.

Four main points were identified regarding current research:

1. Historical and sociocultural approaches to writing systems and written practices contribute to an understanding of the role of social and historical factors in societies and educational institutions.
2. Descriptive linguistic studies are related to the identification of linguistic aspects that are sensitive to differences and similarities of linguistic structures in oral and written texts.
3. Developmental psycholinguistic research concerning children's constructions of different writing systems and of written language has been strongly influenced by theories about the psychogenesis and sociogenesis of written language.
4. Studies from a cognitive psychology perspective are focused on the study of cognitive processing involved in the acts of reading and writing and are aimed at identifying different aspects of the process.

The three workshops gave rise to interesting contributions, from which the chapters included in the present volume were selected. The first were devoted to "Orality and Literacy: Concepts, Methods, and Data" (edited by C. Pontecorvo and C. Blanche-Benveniste). The second (edited by A. Teberosky and L. Verhoeven) were devoted to "Understanding Early Literacy in a Developmental and Cross-Linguistic Approach." The third (edited by U. Frith, G. Lüdi, M. Egli, and C. A. Zuber) focused on the influence of contexts or environmental factors on children's understanding and production of written language; literate practices in monolingual and multilingual situations; features of the social, family, and school literacy contexts; and the contribution of neurolinguistic studies to a better understanding of the normal psychological processes involved in literacy.

There are some novel perspectives in these discussions and analyses: namely, the broadening of our view of writing into a multidisciplinary approach (with the contributions of several disciplines: linguistics, psycholinguistics, sociolinguistics, history of culture and school learning, neurolinguistics, etc.).

"In conclusion, writing and literacy are interdisciplinary objects requiring not only the contribution of different perspectives, but also the interdisciplinary use of critical texts and results from related disciplines" (p. xxiv).

Personally, I consider as traits of the conspicuous originality of this book the consideration of the cultural history of literacy, the interdisciplinary view of its complexity, and the introduction of a neurolinguistic analysis of the processes of acquisition and use of reading and writing.

The 19 scholars who have contributed to the present work with their research and essays represent not only different scientific starting points, but also different social, anthropological, and linguistic contexts (from Europe to the Americas). This book, therefore, deserves worldwide dissemination and serious consideration on the part of competent scholars.

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